

CLAIMS

1. An initiation assembly for an inflator for a pyrotechnic device, the initiation assembly comprising:

an initiator comprising a center pin disposed to convey an activation signal to trigger ignition of a quantity of ignition material;

a body disposed to encircle at least a portion of the initiator; and

a cover attached to the body through a method selected from the group consisting of snap fitting, vibratory welding, and electromagnetic welding to encircle at least a portion of the initiator.

2. The initiation assembly of claim 1, wherein the initiator further comprises a header eyelet encircling at least a portion of the center pin and a bridge wire that electrically couples the center pin and the header eyelet together such that passage of the activation signal through the bridge wire ignites the bridge wire to ignite the ignition material.

3. The initiation assembly of claim 2, wherein the cover is attached to the body to electrically insulate the initiator.

4. The initiation assembly of claim 1, wherein the body and the cover are formed from polymeric materials and the cover comprises a rim, wherein the rim is ultrasonically welded to the body.

1 5. The initiation assembly of claim 1, wherein the cover comprises a rim
2 comprising an inward taper and the body comprises a lip, wherein the rim is elastically
3 enlargeable to snap fit the rim to the lip.

4
5 6. The initiation assembly of claim 1, wherein the body is press fit into place
6 to prevent moisture entry into the inflator and to prevent inflation gases from exiting the
7 inflator through a region encircling the body.

8
9 7. The initiation assembly of claim 1, further comprising an o-ring that
10 encircles a portion of the body to prevent moisture entry into the inflator and inflation gas
11 exit from the inflator through a region encircling the body.

12
13 8. The initiation assembly of claim 1, further comprising a sealing member
14 disposed to encircle at least a portion of the body, the sealing member comprising an
15 annular ridge disposed to press into the body to prevent moisture entry into the inflator
16 and inflation gas exit from the inflator through a region encircling the body.

17
18 9. The initiation assembly of claim 1, wherein the body is part of a receptacle
19 defined by the initiation assembly for receiving a connector such that the connector
20 engages the initiator to enable transmission of the activation signal from the connector to
21 the initiator.

1 10. The initiation assembly of claim 9, wherein the receptacle comprises a
2 plurality of splines shaped to mate with at least one rib of the connector such that the
3 connector is engageable with the retainer in at least three orientations, wherein the splines
4 and the rib mesh to prevent rotation of the connector between the orientations.

5
6 11. The initiation assembly of claim 9, wherein the receptacle comprises a
7 washer comprising an inside diameter disposed to receive the connector, the connector
8 comprising at least one projection, wherein the washer is disposed to engage the
9 projection when the connector engages the initiator to restrict withdrawal of the
10 connector from the initiator.

11
12 12. The initiation assembly of claim 9, wherein the receptacle is disposed
13 within a housing of the inflator, wherein the housing is shaped to retain the body, the
14 housing comprising an inside diameter through which the connector is insertable, wherein
15 the connector comprises at least one projection and the housing is disposed to engage the
16 projection when the connector engages the initiator to restrict withdrawal of the
17 connector from the initiator.

18
19 13. The initiation assembly of claim 9, wherein the receptacle comprises a
20 collar shaped to retain the body, the collar comprising an inside diameter disposed to
21 receive the connector, the connector comprising at least one projection, wherein the collar
22 is disposed to engage the projection when the connector engages the initiator to restrict
23 withdrawal of the connector from the initiator.

1 14. The initiation assembly of claim 9, wherein the receptacle comprises a
2 retainer attached to the body, wherein the retainer is formed of a polymer and has a
3 generally annular shape, wherein the connector comprises at least one projection and the
4 retainer is disposed to engage the projection when the connector engages the initiator to
5 restrict withdrawal of the connector from the initiator.

6
7 15. The initiation assembly of claim 14, wherein the receptacle is shaped to
8 interchangeably interlock with a nonremovable connector and with a removable
9 connector comprising a main body and a locking bracket movable with respect to the
10 main body between an unlocked position in which the connector is removable from the
11 retainer and a locked position in which the connector is not removable from the retainer.

1 16. An initiation assembly for a pyrotechnic device, the initiation assembly
2 comprising:

3 an initiator comprising a quantity of ignition material that ignites in response to
4 receipt of an activation signal;

5 a body disposed to encircle at least a portion of the initiator; and

6 a sealing member disposed to encircle at least a portion of the body, the sealing
7 member comprising an annular ridge disposed to press into the body to prevent moisture
8 entry into the inflator and inflation gas exit from the inflator through a region encircling
9 the body.

10
11 17. The initiation assembly of claim 16, wherein the initiator further
12 comprises a center pin, a header eyelet encircling at least a portion of the center pin, and
13 a bridge wire that electrically couples the center pin and the header eyelet together such
14 that passage of the activation signal through the bridge wire ignites the bridge wire to
15 ignite the ignition material.

16
17 18. The initiation assembly of claim 17, further comprising a cover attached to
18 the body through a method selected from the group consisting of snap fitting, vibratory
19 welding, and electromagnetic welding to encircle at least a portion of the initiator.

20
21 19. The initiation assembly of claim 16, wherein the sealing member
22 comprises a collar shaped to retain the body.

1 20. The initiation assembly of claim 16, wherein the annular ridge comprises a
2 cross section in which two surfaces of the annular ridge meet at an angle of
3 approximately ninety degrees to facilitate deformation of the body by the annular ridge.
4

5 21. The initiation assembly of claim 16, wherein the sealing member
6 comprises a generally conical interior surface that abuts the body, wherein the annular
7 ridge projects inward from the generally conical interior surface.
8

9 22. The initiation assembly of claim 16, wherein the body is part of a
10 receptacle defined by the initiation assembly for receiving a connector such that the
11 connector engages the initiator to enable transmission of the activation signal from the
12 connector to the initiator.
13

14 23. The initiation assembly of claim 22, wherein the receptacle comprises a
15 plurality of splines shaped to mate with at least one rib of the connector such that the
16 connector is engageable with the retainer in at least three orientations, wherein the splines
17 and the rib mesh to prevent rotation of the connector between the orientations.

1 24. An inflator for an airbag module for protecting an occupant of a vehicle
2 from impact, the inflator comprising:

3 a housing;

4 an initiator disposed at least partially within the housing, the initiator comprising
5 a quantity of ignition material that ignites in response to receipt of an activation signal;
6 and

7 a washer comprising an inside diameter disposed to receive a connector such that
8 the connector engages the initiator to enable transmission of the activation signal from
9 the connector to the initiator, the connector comprising at least one projection, wherein
10 the washer is disposed to engage the projection when the connector engages the initiator
11 to restrict withdrawal of the connector from the initiator.

12
13 25. The inflator of claim 24, wherein the initiator further comprises a center
14 pin, a header eyelet encircling at least a portion of the center pin, a cup attached to the
15 header eyelet to provide a hermetic seal, and a bridge wire that electrically couples the
16 center pin and the header eyelet together such that passage of the activation signal
17 through the bridge wire ignites the bridge wire to ignite the ignition material.

18
19 26. The inflator of claim 25, further comprising a body disposed to encircle at
20 least a portion of the initiator and a cover attached to the body through a method selected
21 from the group consisting of snap fitting, vibratory welding, and electromagnetic welding
22 to encircle at least a portion of the initiator.

1 27. The inflator of claim 26, further comprising a collar disposed within the
2 housing to retain the body.

3
4 28. The inflator of claim 26, wherein the body is part of a receptacle that
5 receives a connector such that the connector engages the initiator to enable transmission
6 of the activation signal from the connector to the initiator.

7
8 29. The inflator of claim 28, wherein the receptacle comprises a plurality of
9 splines shaped to mate with at least one rib of the connector such that the connector is
10 engageable with the retainer in at least three orientations, wherein the splines and the rib
11 mesh to prevent rotation of the connector between the orientations.

12
13 30. The inflator of claim 24, wherein the housing is crimped to retain the
14 washer within the housing.

15
16 31. The inflator of claim 24, wherein the washer is welded to the housing.

1 32. An inflator for an airbag module for protecting an occupant of a vehicle
2 from impact, the inflator comprising:

3 a housing;

4 an initiator retained within the housing, the initiator comprising a quantity of
5 ignition material and a center pin disposed to convey an activation signal to trigger
6 ignition of the ignition material; and

7 a cover disposed to encircle at least a portion of the initiator through a method
8 selected from the group consisting of snap fitting, vibratory welding, and electromagnetic
9 welding.

10
11 33. The inflator of claim 32, further comprising a body disposed to encircle at
12 least a portion of the initiator, wherein the initiator further comprises a header eyelet
13 encircling at least a portion of the center pin and a bridge wire that electrically couples
14 the center pin and the header eyelet together such that passage of the activation signal
15 through the bridge wire ignites the bridge wire to ignite the ignition material.

16
17 34. The inflator of claim 33, wherein the body and the cover are formed from
18 polymeric materials and the cover comprises a rim, wherein the rim is ultrasonically
19 welded to the body.

20
21 35. The inflator of claim 33, wherein the cover comprises a rim comprising an
22 inward taper and the body comprises a lip, wherein the rim is elastically enlargeable to
23 snap fit the rim to the lip.

1 36. The inflator of claim 33, wherein a region encircling the body is sealed to
2 prevent moisture entry into the inflator and inflation gas exit out of the inflator via one of
3 a press fit, an o-ring, and an annular ridge disposed to press into the body.
4

5 37. The inflator of claim 33, wherein the body is part of a receptacle defined
6 by the initiation assembly for receiving a connector such that the connector engages the
7 initiator to enable transmission of the activation signal from the connector to the initiator,
8 wherein the receptacle comprises a plurality of splines shaped to mate with at least one
9 rib of the connector such that the connector is engageable with the retainer in at least
10 three orientations, wherein the splines and the rib mesh to prevent rotation of the
11 connector between the orientations.
12

13 38. The inflator of claim 33, wherein the body is part of a receptacle defined
14 by the initiation assembly for receiving a connector such that the connector engages the
15 initiator to enable transmission of the activation signal from the connector to the initiator,
16 wherein the receptacle comprises a washer comprising an inside diameter disposed to
17 receive the connector, the connector comprising at least one projection, wherein the
18 washer is disposed to engage the projection when the connector engages the initiator to
19 restrict withdrawal of the connector from the initiator.

1 39. An inflator for an airbag module for protecting an occupant of a vehicle
2 from impact, the inflator comprising:

3 a housing;

4 a body retained within the housing to encircle at least a portion of an initiator; and

5 a sealing member disposed to encircle at least a portion of the body, the sealing
6 member comprising an annular ridge disposed to press into the body to prevent moisture
7 entry into the inflator and inflation gas exit from the inflator through a region encircling
8 the body.

9
10 40. The inflator of claim 39, wherein the initiator further comprises a center
11 pin, a header eyelet encircling at least a portion of the center pin, and a bridge wire that
12 electrically couples the center pin and the header eyelet together such that passage of the
13 activation signal through the bridge wire ignites the bridge wire to ignite the ignition
14 material.

15
16 41. The inflator of claim 39, further comprising a cover attached to the body
17 through a method selected from the group consisting of snap fitting, vibratory welding,
18 and electromagnetic welding to encircle at least a portion of the initiator.

19
20 42. The initiation assembly of claim 39, wherein the sealing member
21 comprises a collar shaped to retain the body.

1 43. The initiation assembly of claim 39, wherein the body is part of a
2 receptacle defined by the initiation assembly for receiving a connector such that the
3 connector engages the initiator to enable transmission of the activation signal from the
4 connector to the initiator, wherein the receptacle comprises a plurality of splines shaped
5 to mate with at least one rib of the connector such that the connector is engageable with
6 the retainer in at least three orientations, wherein the splines and the rib mesh to prevent
7 rotation of the connector between the orientations.

1 44. An airbag module for protecting an occupant of a vehicle from impact, the
2 airbag module comprising:

3 an electronic control unit that produces an electric activation signal in response to
4 detection of a collision involving the vehicle;

5 a connector coupled to the electronic control unit to receive the electric activation
6 signal;

7 an inflator comprising an initiator, a body disposed to encircle at least a portion of
8 the initiator, and a cover attached to the body through a method selected from the group
9 consisting of snap fitting, vibratory welding, and electromagnetic welding to encircle at
10 least a portion of the initiator, wherein the inflator produces inflation gas in response to
11 receipt of the activation signal; and

12 a cushion disposed to receive the inflation gas and to inflate in response to receipt
13 of the inflation gas to cushion impact of the occupant with an interior surface of the
14 vehicle.

15
16 45. The airbag module of claim 44, wherein the initiator further comprises a
17 header eyelet encircling at least a portion of the center pin and a bridge wire that
18 electrically couples the center pin and the header eyelet together such that passage of the
19 activation signal through the bridge wire ignites the bridge wire to ignite the ignition
20 material.

1 46. The airbag module of claim 44, wherein the body and the cover are
2 formed from polymeric materials and the cover comprises a rim, wherein the rim is
3 ultrasonically welded to the body.

4
5 47. The airbag module of claim 44, wherein the cover comprises a rim
6 comprising an inward taper and the body comprises a lip, wherein the rim is elastically
7 enlargeable to snap fit the rim to the lip.

8
9 48. The airbag module of claim 44, wherein the body is part of a receptacle
10 defined by the initiation assembly for receiving a connector such that the connector
11 engages the initiator to enable transmission of the activation signal from the connector to
12 the initiator, wherein the receptacle comprises a plurality of splines shaped to mate with
13 at least one rib of the connector such that the connector is engageable with the retainer in
14 at least three orientations, wherein the splines and the rib mesh to prevent rotation of the
15 connector between the orientations.

1 49. A method for connecting a connector to an inflator of an airbag module
2 for protecting an occupant of a vehicle from impact, wherein the inflator comprises a
3 washer and an initiator, the washer comprising an inside diameter, the initiator
4 comprising a quantity of ignition material that ignites in response to receipt of an
5 activation signal, the connector comprising a projection, the method comprising:

6 inserting the connector into the inside diameter of the washer such that the
7 connector is in electrical communication with the initiator; and

8 positioning the projection to interlock with the washer to interfere with
9 withdrawal of the connector from the initiator.

10
11 50. The method of claim 49, wherein the initiator further comprises a header
12 eyelet encircling at least a portion of the center pin and a bridge wire that electrically
13 couples the center pin and the header eyelet together such that passage of the activation
14 signal through the bridge wire ignites the bridge wire to ignite the ignition material,
15 wherein the connector comprises a center opening, wherein inserting the connector into
16 the inside diameter comprises inserting the center pin into the center opening.

17
18 51. The method of claim 49, wherein the projection comprises a deflectable
19 tab extending from a main body of the connector, wherein inserting the connector into the
20 inside diameter comprises deflecting the deflectable tab, wherein positioning the
21 projection to interlock with the washer comprises permitting the deflectable tab to return
22 to a substantially undeflected state after passage of the deflectable tab through the interior
23 diameter.

1 52. A method for manufacturing an initiation assembly for a pyrotechnic
2 device, the initiation assembly comprising a body, a cover, and an initiator comprising a
3 quantity of ignition material that ignites in response to receipt of an activation signal, the
4 method comprising:

5 disposing the body to encircle at least a portion of the initiator;
6 disposing the cover to encircle at least a portion of the initiator; and
7 attaching the cover to the body through a method selected from the group
8 consisting of snap fitting, vibratory welding, and electromagnetic welding.

9
10 53. The method of claim 52, wherein the initiator further comprises a header
11 eyelet encircling at least a portion of the center pin and a bridge wire that electrically
12 couples the center pin and the header eyelet together such that passage of the activation
13 signal through the bridge wire ignites the bridge wire to ignite the ignition material,
14 wherein disposing the body to encircle at least a portion of the initiator comprises
15 positioning the body to cover an outer diameter of the header eyelet.

16
17 54. The method of claim 52, wherein the body and the cover are formed from
18 polymeric materials and the cover comprises a rim, wherein attaching the cover to the
19 body comprises ultrasonically welding the rim to the body.

1 55. The method of claim 52, wherein the cover comprises a rim comprising an
2 inward taper and the body comprises a lip, wherein attaching the cover to the body
3 comprises elastically enlarging the rim, disposing the lip inward of the rim, and
4 permitting the rim to shrink to engage the lip.

5
6 56. The method of claim 52, wherein attaching the cover to the body
7 comprises forming a hermetic seal between the cover and the body to prevent moisture
8 entry into the pyrotechnic device and prevent exit of gasses from the pyrotechnic device.